Implementation of a Solid State Amplifier Module for One Megawatt Solid State Solar System Radar

Completed Technology Project (2016 - 2019)

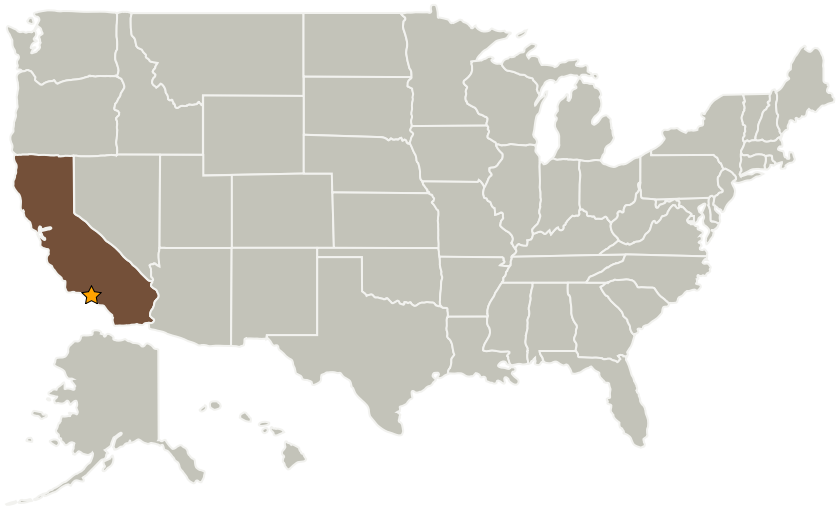
Project Introduction

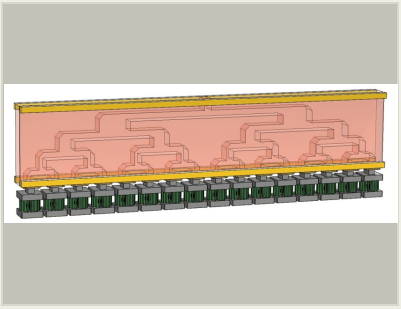
We are proposing the development of a new generation of transmitters for the GSSR based on solid-state technology. The ultimate goal is to develop a 1 MW solid-state transmitter operating at X-band that can provide reliable high output power with graceful degradation and ease of replacement to minimize down time. We envision the MWSSR to house 1024 SPCA amplifier modules. There will be 64 sections, containing 16 SPCAs modules each. A 16-way power combiner waveguide will combine the output of 16 SPCA modules thus producing 16 kW of power. The MWSSR will have 64 16-way power combiners that will be further combined to produce the desired 1 MW of power.

Anticipated Benefits

The development of a Spatial Power Combining Amplifier will replace the unreliable klystron tubes currently used in the DSN. The use of Solid State Amplifiers will provide higher power and wider bandwidth and longer lifetime which will provide for better performance for the radar system with improved signal to noise ratio and allow for increased resolution.

Primary U.S. Work Locations and Key Partners





Waveguide combiner which combines sixteen 1kW modules to produce 16kW RF output unit.

Table of Contents

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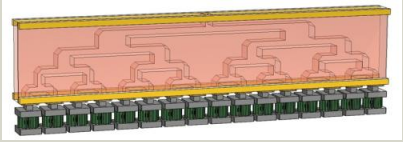
Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Images



JPL_IRAD_Activities Project Image
Waveguide combiner which combines sixteen 1kW modules to produce 16kW RF output unit.
(https://techport.nasa.gov/image/28077)

Organizational Responsibility

Responsible Mission Directorate:
Mission Support Directorate (MSD)

Lead Center / Facility:
Jet Propulsion Laboratory (JPL)

Responsible Program:
Center Independent Research & Development: JPL IRAD

Project Management

Program Manager:
Fred Y Hadaegh

Project Manager:
Fred Y Hadaegh

Principal Investigator:
Juan J Ocampo

Co-Investigators:
Mark Taylor
Jose E Velazco

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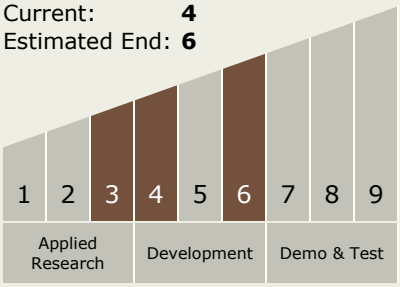
Completed Technology Project (2016 - 2019)

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **6**



Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency
    - TX05.2.2 Power-Efficiency

Target Destination

Foundational Knowledge

Supported Mission Type

Push